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## Social representation of 'loud music' in young adults: A cross-cultural study

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**Social representation of ‘loud music’ in young adults: A cross-cultural study**

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## Abstract

**Background:** Exposure to recreational noise, particularly music exposure, is considered one of the biggest public health hazards of our current time. Some important influencing factors such as socioeconomic status, educational background, and cross-cultural perspectives have previously been found to be associated with attitudes towards loud music and the use of hearing protection. Although, culture seems to play an important role, there is relatively little known about how it influences perceptions regarding loud music exposure in young adults.

**Purpose:** The present study was aimed to explore cross-cultural perceptions of and reactions to loud music in young adults (18-25 years) using the theory of social representations (TSR) and text mining analysis.

**Research Design:** The study used a cross-sectional survey design.

**Study Sample:** The study sample included young adults (n=534) from five different countries (India, Iran, Portugal, United States, and United Kingdom) who were recruited using convenience sampling.

**Data Collection and Analysis:** Data were collected using a questionnaire. Data were analyzed using a content analysis, co-occurrence analysis, and also chi-square analysis.

**Results:** Fairly equal numbers of positive and negative connotations (about 40%) were noted for positive and negative connotations in all countries. However, the chi-square analysis showed significant differences between the countries (most positive connotations were found in India and Iran, whereas the most negative connotations were found in the United Kingdom and Portugal) regarding the informants' perception of loud music. The co-occurrence analysis results generally indicate that the category "negative emotions and actions" occurred most frequently, immediately followed by the category "positive emotions and actions". The other most frequently occurring categories included: "acoustics," "physical ailment," "location," and "ear and hearing problems." These six categories formed the central nodes of the social

representation of loud music exposure in the global index. Although, some similarities and differences were noted among the social representations towards loud music among countries, it is noteworthy that more similarities were noted among countries than differences.

**Conclusions:** The study results suggest that ‘loud music’ is perceived to have both positive and negative aspects within society and culture. We suggest that the health promotion strategies should focus on changing societal norms and regulations in order to be more effective in decreasing the noise and/or music induced auditory symptoms among young adults.

**Key Words**

Music listening, Hearing loss, Public health hazard, Attitude, Social representation, Social perception, Text mining, Cross-culture

**Abbreviations**

MIHL - Music Induced Hearing Loss; TSR – Theory of Social Representation; UK - United Kingdom; USA - United States of America; WHO - World Health Organization

## Introduction

Music, all over the world, is considered a pleasant and enjoyable sound (Chasin, 2009). Across cultures, people in the modern world listen to music at home and in social settings. Globally, music has become an accepted part of the acoustic environment. Considering that music is ubiquitous in the modern world, the risk of hearing loss resulting from exposure to music played at hazardous levels has become a global concern. Nonetheless, how young people in various countries feel about or perceive 'loud music' may differ substantially (Widén, Holmes & Erlandsson, 2006). These differences may be important while developing effective public health campaigns to improve the likelihood that action is taken to protect hearing.

Excessive exposure to loud music leads to permanent damage of hearing, which has been referred to as music induced hearing loss (MIHL). For example, exposure to music at high intensity and for long periods of time is likely to induce several hearing symptoms, such as temporary threshold shift, tinnitus, hyperacusis, recruitment, distortion, or abnormal pitch perception, eventually resulting in permanent hearing loss (Zhao et al., 2010). Numerous early studies have explored music-induced hearing loss primarily in professional musicians (Emmerich et al., 2008; Jansen et al., 2009) and people working in music venues (Sadhra et al., 2002). However, there is substantial evidence in literature showing an increasing potential risk of MIHL in the general public, particularly among adolescents and young adults (for review see - Jiang et al., 2016).

Although substantial evidence has shown that risk to hearing health is strongly associated with exposure to loud music, much more work needs to be done in terms of providing comprehensive regulation and education for the public in order to raise awareness and hence

prevent MIHL. During 1997, the World Health Organization (WHO) published a document concerning probable increased risks of future hearing damage due to music exposure, particularly in adolescents and young adults (World Health Organization, 1997). Since then, there have been several studies of education programs relating to leisure noise (e.g., loud music, fireworks, toys) indicating varying degrees of success. Studies suggest that knowledge about risk of hearing loss as a result of loud noise or music does not lead to healthy listening behavior (for review see Zhao et al., 2012). For example, Kotowski et al. (2011) evaluated the effectiveness of education provided through brochures to reduce the risk of noise induced hearing loss in college students. Their study results indicated that although people receiving the brochure resulted in a greater perception of hearing loss and efficacy to use ear plugs when in loud environments, intentions to use ear plugs were unchanged. In general, these studies show that there is less likelihood of protective behavior in relation to music noise before the onset of hearing symptoms, although protective behavior increases when symptoms are experienced (Laitinen et al., 2008; Rawool et al., 2008). At this stage, those who experience symptoms may have already developed some damage in the hearing system, hence efforts are needed to prevent these early damages.

A number of factors appear to be important indicators of the success of education towards protective behaviour towards music exposure. In a recent review, Vogel et al. (2007) identified several sociodemographic and psychosocial correlates such as age, gender, school level, ethnicity, music preference, physical activity, and social influence. However, some important influencing factors such as socioeconomic status, educational background, and cross-cultural perspectives have previously been found to be associated with attitudes towards loud music and the use of hearing protection (Olsen-Widén & Erlandsson, 2004; Widén, 2013). In a previous study, cultural differences were found between the USA and

Sweden regarding young adults' attitudes towards loud music and the use of hearing protection (Widén et al., 2006). The attitudes were more positive towards loud music in the USA sample in comparison to the Swedish sample. In addition, the use of hearing protection was found to be much lower within the American sample in comparison to the Swedish (Widén et al., 2006). Also, in a recent study, adolescents' positive attitudes to loud music were found to be associated with deteriorated hearing and lesser use of hearing protection (Keppler et al., 2015). Hence such factors should be further explored because consideration of the influence of cultural, regional, and socioeconomic factors related to attitudes and risk behaviors towards music exposure is crucial for determining an effective music exposure education program.

It is therefore essential to understand the common ways of conceiving and thinking about music exposure in order to evaluate the social reality. The theory of social representation (TSR) is about processes of examining collective meaning, resulting in the discovery of common cognitions which produce social bonds uniting societies, organizations, and groups (Höijer, 2011). TRS sits within the social psychology. At the group level of analysis, "*the social representation is a set of concepts, statements, and explanations originating in daily life in the course of inter-individual communications*" (Moscovici, 1981, pp. 181). In other words, in order for people in groups to talk to one another, they need a system of common understanding. Such a system is necessary, particularly for concepts and ideas that are outside of 'common' understanding or which have particular meaning for that group. Words thus become imbued with special meaning within particular social groups. The significance of this is that meaning is created through a system of social negotiation rather than being a fixed and defined thing. Hence, its interpretation may well require an understanding of additional aspects of that social environment. Social representation can be formed as a result of

attitudes, ideologies, beliefs, and the knowledge that it is unique to a particular social group. Hence, the TRS may help uncover the social reality of a particular group about a particular phenomenon.

Two recent exploratory studies looked into the social perception towards “hearing loss” and “hearing aids” in adults from the general population (Manchaiah et al., 2015a, 2015b). The results indicate that TSR appears to be a fruitful approach to investigate views on hearing loss and hearing aids from a broader perspective, showing various clusters of components in social representation (e.g., disability, causes of hearing loss, communication difficulties, negative mental states, and hearing instruments). In addition, cultural factors seemed to play a certain role in the respondents’ social representations of hearing loss (Manchaiah et al., 2015a, 2015b). Hence, it is noteworthy that cultural values affect social representations in some way because culture can be referred to as a broader network of representations held together by a whole community (Duveen, 2007).

Considering the above discussion, it is reasonable to anticipate that individuals with differing nations or geographic locations may have different ways of perceiving and interpreting situations related to music exposure and music induced hearing loss. The current study was aimed to explore cross-cultural perceptions of and reactions to ‘loud music’ using the TSR. The study results can help us better understand the differences in attitudes and perceptions about loud music in different countries and cultures, consequently contributing to the development of strategies for effective hearing health education in terms of raising awareness, increasing knowledge, and promoting healthy behavior.

**Method**



### ***Ethical Considerations***

Ethical approval was obtained for each country from local institutional ethical boards, which include: All India Institute of Speech and Hearing, Mysore, India; Department of Audiology, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran; School of Allied Health Sciences, Polytechnic Institute of Porto, Porto, Portugal; Research Ethics Committee, Anglia Ruskin University, Cambridge, the United Kingdom; and Institutional Review Board, Lamar University, Beaumont, United States.

### ***Study design and participants***

The study employed a cross-sectional design and the data were collected from five different countries (India, Iran, Portugal, United Kingdom, and United States). The five countries chosen differed in terms of culture, language, and economy (see Table 1). The study sample included young adults (n=534) who were recruited using convenience sampling (see Table 2 for details).

[Table 1 near here]

### ***Data collection***

Data were collected using a questionnaire (see Appendix). In each country, researchers approached young adults via university and city center shopping malls requesting them to take part in the study. There was no background music in the locations where the data was collected. All those who showed interest were provided with detailed information about the study, and were given the opportunity to ask questions. Those who agreed to participate completed the questionnaires and return of the questionnaire was taken as consent. Participation in the study was voluntary, and questionnaire completion anonymous as the

participants did not provide any personal information that would have compromised their identity. There was no compensation provided to participants.

The questionnaire required participants to report up to five words or phrases that immediately come to mind while thinking about “loud music” by writing them in the questionnaire. They were also asked to indicate whether each word or phrase they reported had positive, neutral or negative connotations. Similar data was also collected for “music” which has been presented elsewhere (Manchaiah, Submitted). Some demographic information (e.g., age, gender, education, profession, music listening hours) were recorded.

This method of eliciting responses instantaneously is known as free-association task method, and has been used to access the semantic content of social representation in various studies (Danermark et al., 2014; Linton et al., 2013; Manchaiah et al., 2015a, 2015b). The object of representation (i.e., loud music) is used to prompt associations. These responses are considered less controlled due to the spontaneous nature of eliciting the responses. Hence, they may provide better understanding of what constitutes the semantic universe of the term of subject being investigated (Abric, 1994).

The original version of the questionnaire was developed in English and used in the United Kingdom and the United States. The questionnaire was translated into Kannada, Farsi, and Portuguese, and to be used in India, Iran, and Portugal, respectively. A well-accepted forward and back-translation method was used for the translation of questionnaires (Beaton et al., 2000).

**Data analysis**

Data was analyzed using both qualitative and quantitative methods in three main steps. These include: (1) content analysis; (2) co-occurrence analysis; and (3) Chi-square analysis.

Reported words/phrases were used in the content analysis and co-occurrence analysis, whereas the frequency of connotations (positive, neutral, or negative) was used for Chi-square analysis.

In the first instance, the responses (i.e., words and phrases) were categorized using the qualitative content analysis (Graneheim and Lundman, 2004). This was to identify similarity in terms of meaning among different words or phrases reported. The quality of grouping was checked by multiple comparisons among researchers. When there was disagreement between the two research studies, the main author consulted with the person who collected the data in each country to clarify this based on non-translated responses, which helped in reaching a consensus.

The co-occurrence analysis is based on mathematical graph theory, and used to study the frequency of each category and associations and/or inter-relations between categories (Flament, 1965). The co-occurrence analysis was done through the Iranmuteq software program, which is R-interface for multidimensional analysis of texts and surveys (R Development Core Team, 2016; Ratinaud & Marchand, 2012). This software produces an index called “maximum tree.” In this index, the size of the nodes represent the frequency of the categories (i.e., bigger nodes indicate higher frequencies). The software places the nodes for categories randomly, and the placement of these nodes does not have any significance.

However, the line between the nodes showing the link represent inter-category associations based on the responses obtained. Only the strongest links between the categories are retained in the maximum tree index, and the number corresponding to the connection between the

categories depicts the frequencies of the individuals associating with both categories. For example, in Figure 2 the categories “negative emotions or actions” and “acoustics” are connected with 44 individuals who mentioned both categories when they talked about music. Hence, this maximum tree index provides an overall description of the data in terms of main categories and its association.

Numbers of positive, neutral and negative connotations were counted and the frequency was calculated (see Figure 1). Chi-square analysis was performed to identify if any differences in frequencies between groups or categories were reported among countries.

Results

Participants’ demographics

Table 2 provides demographic details of the study participants. The average age of participants was around 20 years in all countries, and there was equal spread of males and females. However, some differences existed in terms of other demographic variables (e.g., education, profession, and music listening habits). Music listening habits varied considerably among countries. For example, participants in India on an average listen to music 2.68 hours a week; participants from United States on an average listen to music about 25.52 hours a week; whereas participants from the other three countries on an average listen to music anywhere from 12 to 18 hours a week. These differences in music listening hours may be attributed to reasons such as accessibility to personal listening devices, and to a lesser degree, cultural differences.

[Table 2 near here]

### ***Positive, neutral, and negative connotations***

Frequencies of positive, neutral, and negative connotations for loud music related aspects in all five countries are shown in Figure 1. Equally high frequencies of positive and negative connotations (about 40%), and some neutral connotations (about 20%) were found in all five countries. Chi-square analysis was performed across the countries and connotation categories (positive, neutral, and negative) to see if the frequency of connotations varied across the countries. The analysis indicates that the most positive connotations were found in India and Iran, whereas the most negative connotations were found in the United Kingdom and Portugal. Chi-square analysis showed significant differences ( $\chi^2 = 72.65$ ;  $df = 8$ ;  $p < 0.001$ ;  $N = 2664$ ) between the countries regarding the participants' perception of loud music.

[Figure 1 near here]

### ***Response categories***

The participants' responses were categorized based on their meaning, which resulted in 19 categories (see Table 3). It is noteworthy that not all categories were found in all five countries, although some similarities and differences were observed among these countries. "Positive emotions or actions" and "negative emotions or actions" were the two most frequently occurring categories in all five countries. Other most frequently occurring categories in all countries included: ear and hearing problems; physical ailment; party and alcohol.

[Table 3 near here]

*Social representation based on co-occurrence analysis*

Examination of the maximum tree indexes based on the co-occurrence analysis provides useful insights in terms of cross-country and/or cross-cultural differences and similarities in responses. In these indexes, the nodes represent the frequency of each category, whereas the line connecting the nodes represents the inter-relation between the categories. Figures 2, 3, 4, 5, and 6 represent maximum tree indexes for the countries of India, Iran, Portugal, United Kingdom, and United States respectively.

Results generally indicate that in all five countries, the category “negative emotions and actions” was the most frequently occurring category, followed by the category “positive emotions and actions.” However, in India (see Figure 2), the frequency of the category “positive emotions or actions” was relatively small when compared to the frequency of “negative emotions or actions,” and also when compared to responses for these two categories in the other four countries. In addition, the category “acoustics” occurred most frequently in India (see Figure 2) and the United States (see Figure 6). The category “location” occurred most frequently in Portugal (see Figure 4) and the United Kingdom (see Figure 5), and the categories “isolation” and “music genre” occurred most frequently in Portugal (see Figure 4). In Iran, there were not any additional categories standing out in terms of frequencies, other than “negative emotions or actions” and “positive emotions or actions” (see Figure 3).

Close examination of co-occurrence analysis suggest that the responses pattern for the countries of the United Kingdom and the United States are similar, whereas the responses for other three countries (India, Iran and Portugal) are markedly different. Culturally, we may assume that the United Kingdom and the United States may be more similar when compared

to the other countries included in this study. The results of co-occurrence analysis is also most similar in these two countries, wherein the three most frequently occurring categories include: “negative emotions and actions,” “positive emotions or actions,” and “ear and hearing problems.” Some similarities can also be noted among all countries. For example, the category “party and alcohol” was associated with loud music across all countries and/or cultures, including India and Iran where there are some religious prohibitions regarding the use of alcohol. Understanding these minor differences are important while developing public health promotion activities within the country and/or culture.

The global index (see Figure 7) showed a similar pattern as most countries with the two categories “negative emotions and actions” and “positive emotions and actions” occurred the most frequently. The other most frequently occurring categories included: “acoustics,” “physical ailment,” “location,” and “ear and hearing problems.” These six categories formed the central nodes of the social representation of loud music in the global index.

[Figure 2 near here]

[Figure 3 near here]

[Figure 4 near here]

[Figure 5 near here]

[Figure 6 near here]

[Figure 7 near here]

## Discussion

The current exploratory study was aimed to understand the cross-cultural perceptions of and reactions to ‘loud music’ using the TSR.

The positive, neutral, and negative connotations were found to be approximately 40%, 20%, and 40% respectively for all five countries. These results suggest that loud music is perceived to have both positive and negative aspects within society and culture. Although the participants are aware of potential harmful effects of exposure to loud music, it is still associated with positive representations by the participants. However, significant differences were found between countries for positive, neutral, and negative connotations (e.g., India and Iran had the most positive connotations, whereas Portugal and the United Kingdom had the most negative connotations), indicating some cultural differences. Cultural values may affect social representations in some way because culture can be understood as a broader network of representations held together by a whole community (Duveen, 2007). It could be argued that individuals from “positive” countries may expose themselves to more and louder music, and in addition use hearing protection to a lesser degree since their behavior to some extent is influenced by culturally shaped social representations and norms. In that case, we could say that culturally formed social representations play a role in hearing related risk-taking, which may have an impact on individuals’ decisions regarding preventive behavior (e.g. use of hearing protection, lessened exposure to loud music), resulting in longer term consequences and a more profound impact on the development of music induced hearing impairments.

The study also revealed that there are differences between the countries regarding which categories that were mentioned. The categories “personal listening devices” and “music genre” were rather common representations in the UK and the USA, but not in India. There were also some similarities between the countries; specifically, “positive emotions or actions” and “negative emotions or actions” were the two most frequently occurring categories in all five countries. The category “negative emotions and actions” was found to be the biggest



category of response in all countries, although a higher frequency of responses was obtained for the category “positive emotions or actions.” Other frequently occurring categories in the five countries were “ear and hearing problems,” “physical ailment,” “party and alcohol.” Noteworthy is that some categories reported could have both positive and negative connotations in the responses of different participants. For example, some participants saw the category “location” positively, whereas others viewed this same category negatively as evidenced by the responses. In general, these results indicate that loud music is considered to produce both positive and negative emotions and/or actions in all five countries studied. Hence, the global index representing these main aspects (see Figure 7).

The cultural differences found in the study deals with the ways in which individuals within differing nations vary in terms of their cultural value systems, which are socially shared ideas that may influence how people view the world in terms of their choices, actions, and behavioral preferences (Knafo, Roccas and Sagiv, 2011). According to Knafo et al. (2011), values can be conceptualized at the individual level, whereby they affect the way that people interpret behavioral choices, preferences, and actions. At the national level, values reflect the assumptions that societal groups make about social and organizational processes; these can be used to make comparisons between national cultures. The cultural differences in social representations may have consequences for how people perceive potential health risks associated with music exposure and protective behavior in terms of e.g. avoiding noisy activities or protecting themselves by using hearing protection when attending activities where loud music is played. Previous research has found cultural differences in attitudes to loud music and the use of hearing protection, which can be explained by different cultural values or social representations within a specific cultural context (Widén et al., 2006). Other studies have also suggested that there are cross-cultural differences in the way that culturally-

related factors moderate perceptions of health, disability, and disease, which implies that individuals within differing nations or geographic locations may have different ways of perceiving and interpreting situations related to hearing loss and hearing aid use. For example, Devins et al. (2009) looked at cultural values and attitudes as moderators of the relationship between illness, emotional distress, and subsequent lifestyle changes forced by the onset of Rheumatoid Arthritis, a chronic, debilitating autoimmune disease. The authors found that those persons characterized by higher levels of horizontal individualism (i.e., extent to which individuals strive to be distinct without desiring special status), or the aspect of individualism that is associated with group equality and autonomy, were more flexible in dealing with the effects and constraints of the disease. The authors suggested that people high in individualism were better able to adapt to changing circumstances created by ill health or disability by viewing the disease as an opportunity to adopt new coping strategies and tactics, and it was found that this ability resulted in lower levels of stress.

It is suggested that there may be culturally related differences in the way that people interpret situations related to health issues. More specifically, research suggests that there are cultural differences in the perceptions of music exposure, and that these perceptions may be linked to attitudes towards hearing loss and its related consequences (for review see Zhao et al., 2012). On a different note, knowledge of risk does not necessarily result in healthy listening behavior at the individual level (Kotowski et al., 2011). Hence, health promotion strategies should focus on changing not merely individual attitudes, but also societal norms and regulations in order to decrease noise induced auditory symptoms among adolescents (Landälv et al., 2013). For this reason, understanding socially shared values and constructs are important.

The TSR suggests that individuals' views of health issues are socially constructed and form part of the shared value systems of a specific cultural group (Moscovici, 2000). The present study reveals some cultural differences in social representations regarding 'loud music.' This is interesting since it may imply differences in perceptions of risks, actions regarding health oriented behavior, and health risk taking in a particular social group. If it is uncommon within a specific society to associate loud music with potential hearing problems or that one should use earplugs when attending activities where loud music is played, it is likely that individuals will perform "normal behavior" or "culturally acceptable behavior" without perceiving it as potentially dangerous to their hearing. The social representation of a particular group can be influenced over a period of time, especially with the use of strong forces like media (Höijer, 2011), which can consequently influence the behavior of individuals within that social group (Bidjari, 2011). In this context, the focus is to influence attitudes and behaviors of a group within a society. Hence, future research on attitudes towards music listening and protective behavior may draw some inspiration from this public health viewpoint.

### *Strengths and limitations of the study*

The current study was unique in the way that it had data from five different countries and also in the manner in which it employed a new theoretical framework (i.e., TSR) to understand the perceptions of young adults towards loud music exposure. However, it had many limitations. Factors such as educational level, gender, socio-economic levels are found to be influencing the attitudes of those with NIHL. However, these factors were not part of the analysis as the current theoretical framework does not make allowances. Moreover, considerable difference was noted among countries in terms of music listening hours, which may have influenced the study results. The study sample was recruited using a convenience sampling, which may have introduced some bias. There is no particular way to calculate a sample size for this method.

So, we are unsure that if we had collected more data, if any new categories would have emerged. However, the responses formed two central nodes on a few categories (negative emotions or actions, positive emotions or actions), suggesting that the response was coherent and across countries. Despite this, caution must be taken while generalizing the results of this exploratory study.

Conclusions

The current study explored the social representations of young adults towards ‘loud music.’ Fairly equal numbers of positive and negative connotations (about 40%) were noted for positive and negative connotations in all countries. However, the Chi-square analysis showed that the positive, neutral, and negative connotations varied across countries, indicating the presence of cultural differences in social representations of loud music. The co-occurrence analysis results generally indicate that the category “negative emotions and actions” most frequently occurred, followed by the category “positive emotions and actions” in all countries, except in India where the frequency of the latter category was not the second largest. The other most frequently occurring categories included: “acoustics,” “physical ailment” “location,” and “ear and hearing problems.” These six categories formed the central nodes of the social representation of loud music exposure in the global index. Although some similarities and differences were noted among the social representations towards loud music among countries, it is noteworthy that more similarities were noted among countries than differences. The study results suggest that loud music is perceived to possess both positive and negative aspects within society and culture. Previous studies suggest that the attitude modification in relation to music listening is not effective at individual levels. Hence, we suggest that health promotion strategies should focus on changing societal norms and regulations in order to be more effective in decreasing the noise induced auditory symptoms

among young adults. For this purpose, understanding the social representation of loud music in different countries and cultures is required.

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Figures

Figure 1: Positive, neutral and negative connotations

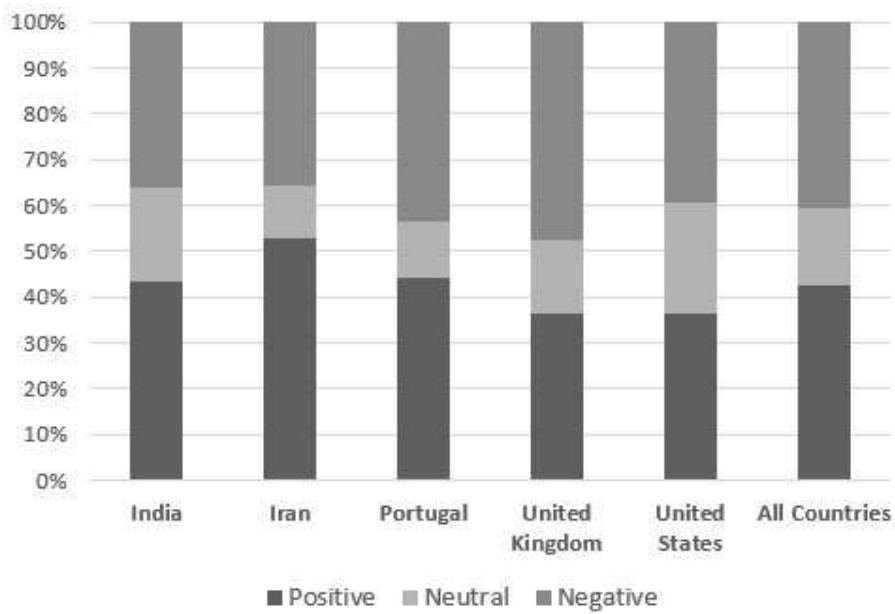


Figure 2: Co-occurrence analysis index for India, showing main categories related to loud music listening and their associations with each other (N=110)

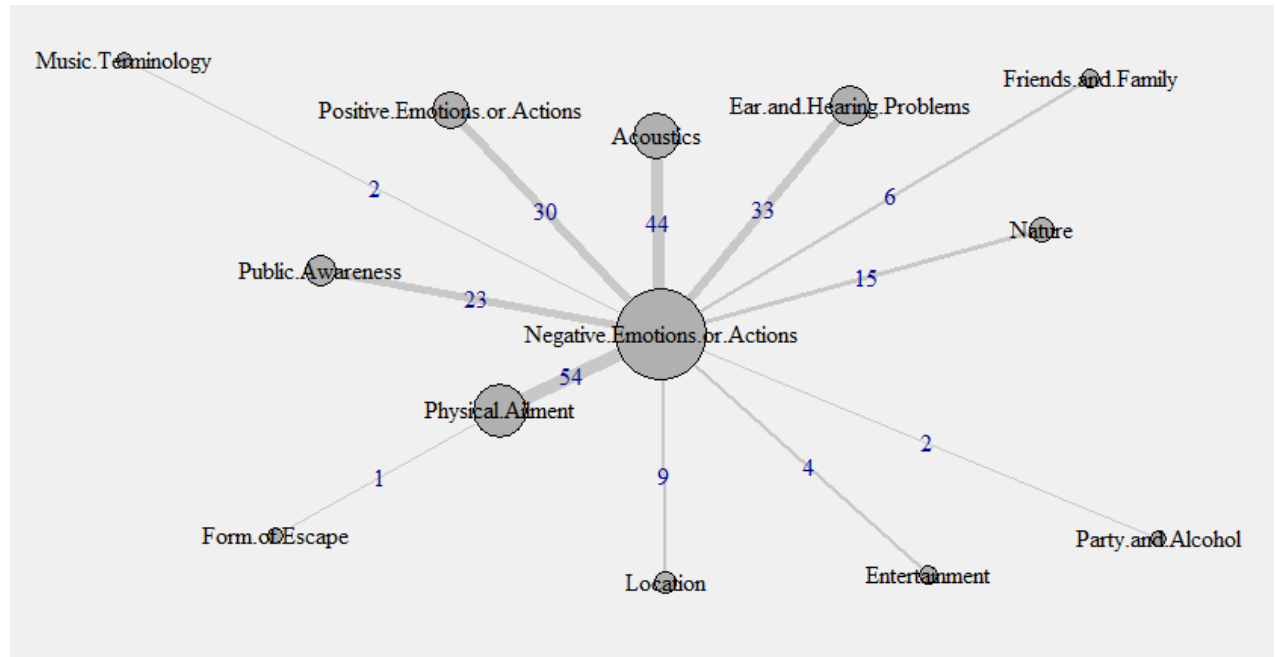


Figure 3: Co-occurrence analysis index for Iran, showing main categories related to loud music listening and their associations with each other (N=100)

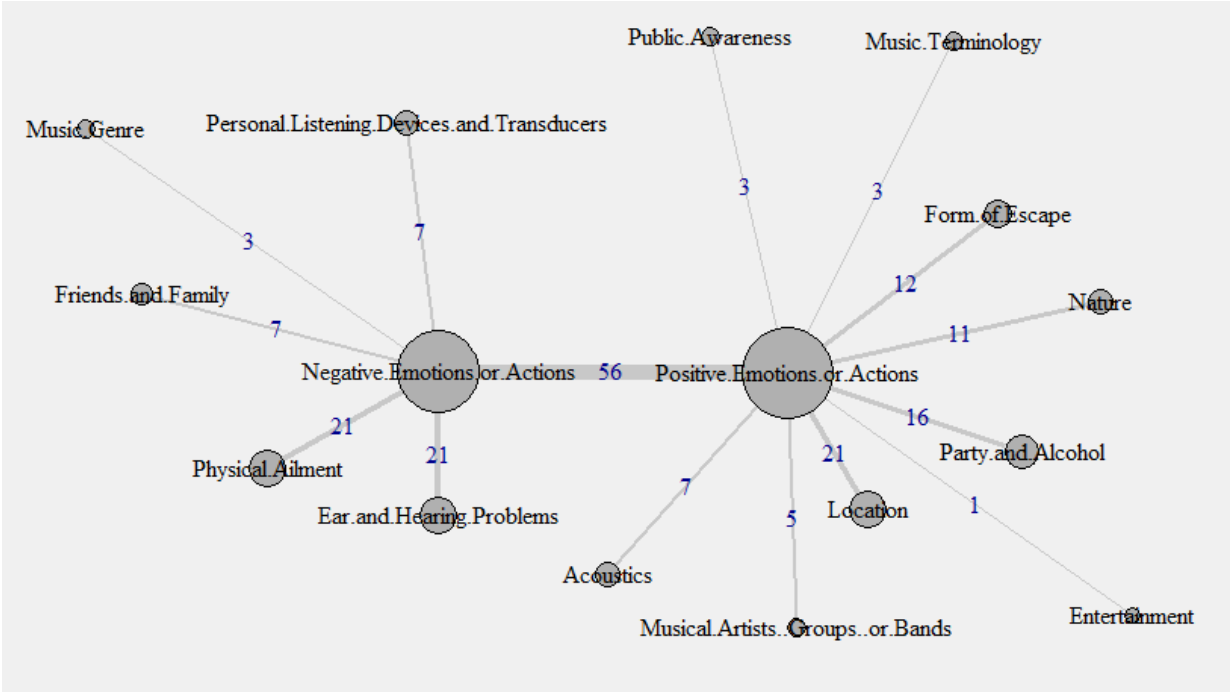


Figure 4: Co-occurrence analysis index for Portugal, showing main categories related to loud music listening and their associations with each other (N=101)

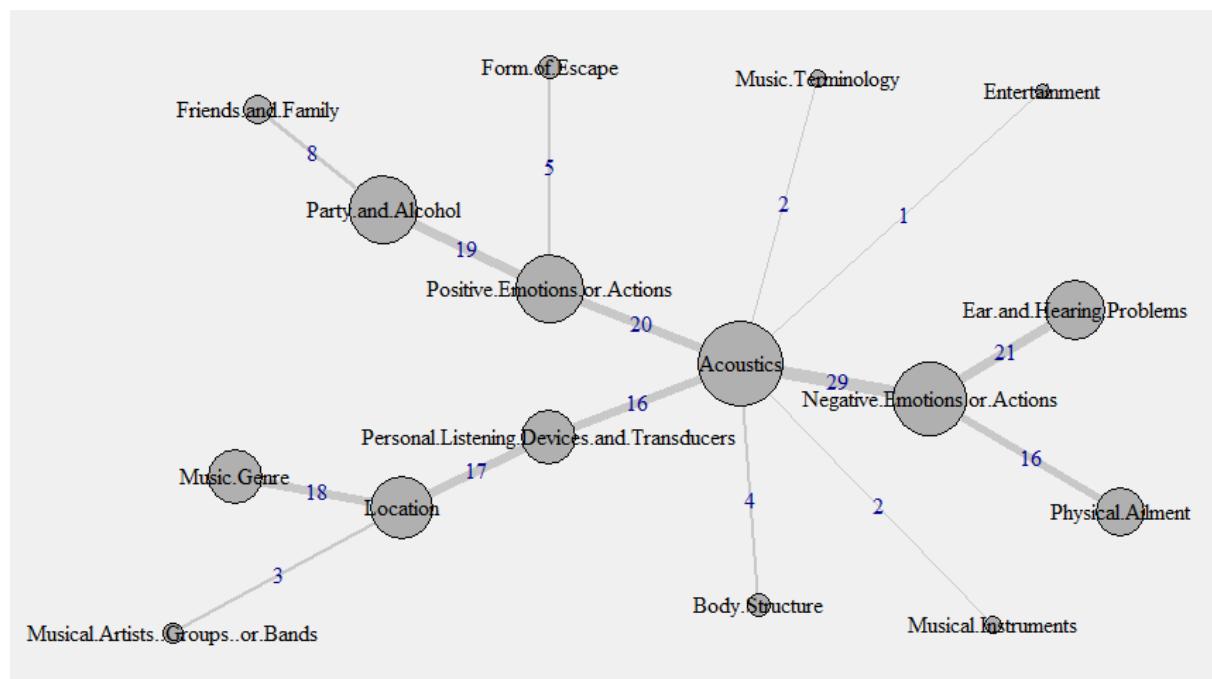


Figure 5: Co-occurrence analysis index for United Kingdom, showing main categories related to loud music listening and their associations with each other (N=122)

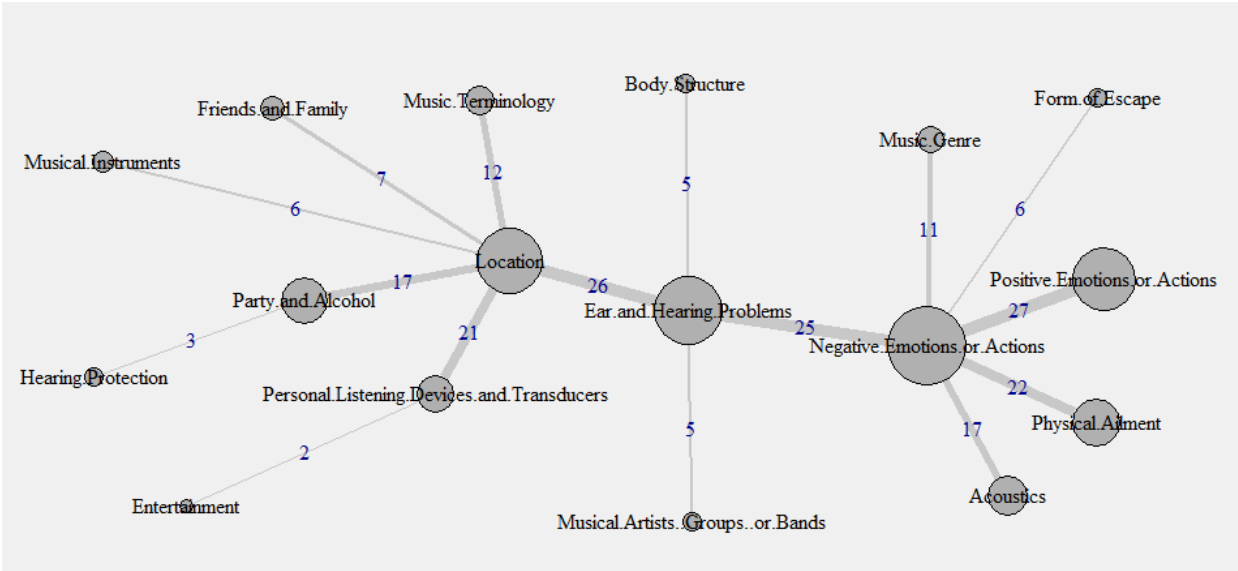


Figure 6: Co-occurrence analysis index for United States, showing main categories related to loud music listening and their associations with each other (N=101)

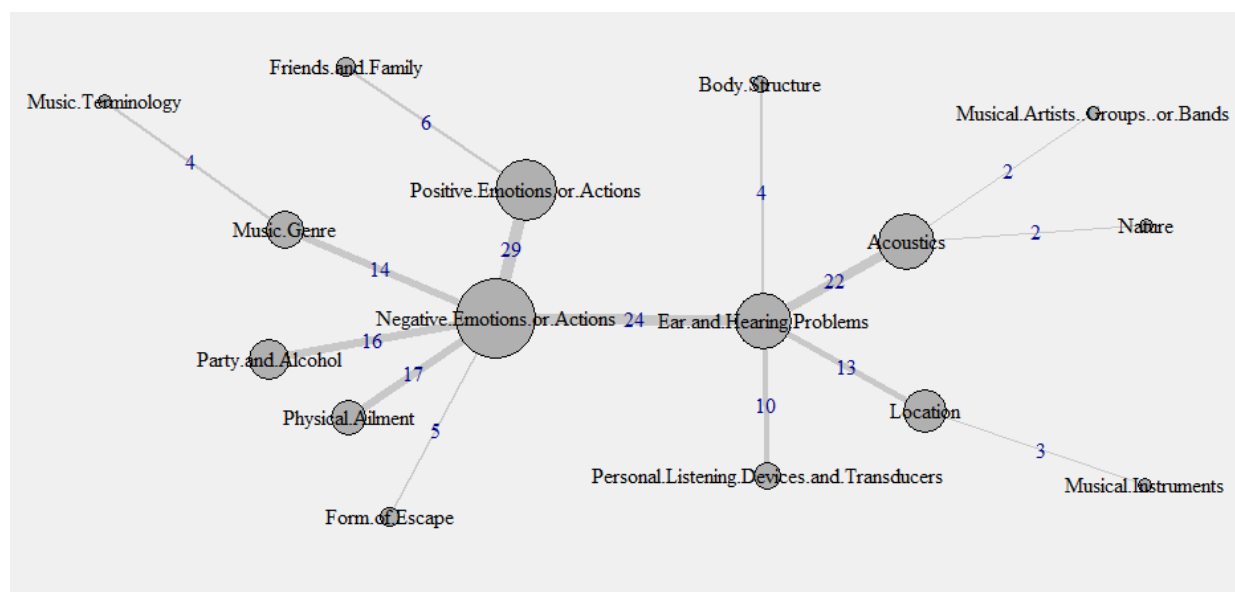
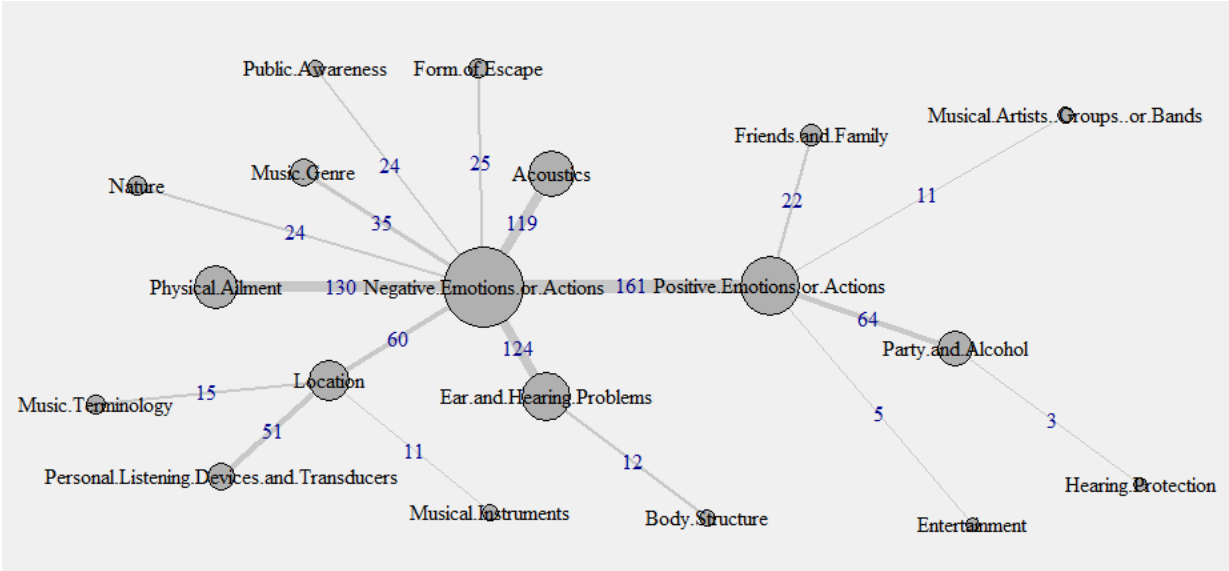


Figure 7: Global co-occurrence analysis index, showing main categories related to loud music listening and their associations with each other (N=534)





## Tables

**Table 1: Population details in India, Iran, Portugal, United Kingdom, and United States**

<b>Country</b>	India	Iran	Portugal	United Kingdom	United States of America
<b>Population (in Millions)</b>	1,210	77	11	64	320
<b>Continent</b>	Asia	Asia	Europe	Europe	North America
<b>City where data were collected</b>	Mysore	Tehran	Porto	Cambridge	Beaumont
<b>Population in city where data were collected (in Millions)</b>	1	8.3	1.3	0.13	0.11
<b>National language</b>	Hindi	Farsi	Portuguese	English	English
<b>Language of local place if different</b>	Kannada	Farsi	Portuguese	English	English

Table 2: Demographic details

	All countries (n=534)	India (n=110)	Iran (n=100)	Portugal (n=101)	UK (n=122)	USA (n=101)
Age in years (Mean±SD)	21.04±2.5	21.05±2.2	22.24±2.6	19.72±1.8	22.02±2.6	19.99±1.8
Gender (% female)	56.6	50	53	63.4	61.5	54.5
Education (%)						
▪ Compulsory	27.5	0	52	0	0	94.1
▪ Secondary	62.2	72.7	48	96	82.8	5.9
▪ Tertiary	10.3	27.3	0	4	17.2	0
Profession (%)						
▪ Non-manual	18.2	23.6	25	3	32	4
▪ Manual	0.7	0	3	0	0.8	0
▪ Student	81.1	76.4	72	97	67.2	96
Music listening in hours per week (Mean±SD)	14.47±19.7	2.68±1.5	14.08±12.2	12.45±12.8	17.93±16.6	25.52±33.5
Play music (Yes in %)	21.9	18.2	35	15.8	37.7	Data not available

**Table 3: Percentage of categories reported among different countries for loud music**

No	Categories	Number of responses (% responses)					
		India	Iran	Portugal	UK	USA	All countries
1	Negative Emotions or Actions (e.g. sadness, discomfort, displeasure, confusion, irritation)	295(53.6)	128(25.9)	70(13.9)	125(20.5)	132(26.2)	750(28.2)
2	Positive Emotions or Actions (e.g. joy, happiness, singing, dancing, fun)	34(6.2)	192(38.9)	73(14.5)	79(13.0)	78(15.5)	456(17.1)
3	Ear and Hearing Problems (e.g. hearing loss, tinnitus, otalgia)	38(6.9)	26(5.3)	40(7.9)	79(13.0)	55(10.9)	238(8.9)
4	Acoustics (e.g. sound, decibel, noise, loudness, intensity)	49(8.9)	12(2.4)	64(12.7)	34(5.6)	55(10.9)	214(8.0)
5	Location (e.g. festivals, work, concerts, bar)	10(1.8)	27(5.5)	56(11.1)	72(11.8)	37(7.3)	202(7.6)
6	Physical Ailment (e.g. pain, sickness, headache...)	69(12.5)	25(5.1)	32(6.3)	42(6.9)	25(5.0)	193(7.3)
7	Party and Alcohol (e.g. boisterous nightlife, loud DJ, drunkenness, ...)	2(0.4)	21(4.3)	45(8.9)	47(7.7)	30(6.0)	145(5.4)
8	Personal Listening Devices and Transducers (e.g. earphones, phones, mp3, speakers...)	-	10(2.0)	36(7.1)	31(5.1)	20(4.0)	97(3.6)

9	Music Genre (e.g. disco, jazz, rock, heavy metal)	-	4(0.8)	39(7.7)	21(3.4)	31(6.2)	95(3.6)
10	Friends and Family (e.g. neighbors, friends, family)	6(1.1)	10(2.0)	13(2.6)	13(2.1)	8(1.6)	50(1.9)
11	Form of Escape (e.g. freedom, distraction, isolation, dream)	1(0.2)	15(3.0)	9(1.8)	7(1.1)	11(2.2)	43(1.6)
12	Music Terminology (e.g. rhythm, melody, music, song)	2(0.4)	3(0.6)	3(0.6)	19(3.1)	5(1.0)	32(1.2)
13	Musical Artists, Groups, or Bands (e.g. specific artist name, band)	-	5(1.0)	10(2.0)	10(1.6)	3(0.6)	28(1.1)
14	Nature (e.g. sea, mountains, rain...)	15(2.7)	12(2.4)	-	-	3(0.6)	30(1.1)
15	Public Awareness (i.e. community at large being aware of adverse effects of loud music)	25(4.5)	3(0.6)	-	-	-	28(1.1)
16	Body Structure (e.g. ear, vocal cords)	-	-	11(2.2)	7(1.1)	5(1.0)	23(0.9)
17	Musical Instruments (e.g. piano, flute, guitar)	-	-	3(0.6)	12(2.0)	6(1.2)	21(0.8)
18	Entertainment (e.g. MTV, radio)	4(0.7)	1(0.2)	1(0.2)	3(0.5)	-	9(0.3)
19	Hearing Protection	-	-	-	8(1.3)	-	8(0.3)

## Appendix: Questionnaire

### Section 1: Demographic details

Age:	Gender:
Maximum level of education achieved:	Profession:
How long (in hours) do you listen to music every week?:	

### Section 2: Free associations about "Loud Music"

- *Stage 1:* Please write five words or expression that comes spontaneously to your mind when you think about the term 'loud music'.
- *Stage 2:* Determine if the association represents a positive (+), neutral (0) or negative (-) aspect of 'loud music' and enter them in front of the words or expressions by ticking the relevant box.

Words or expressions	Connotations		
	Positive	Neutral	Negative